

Solar Water Pumping

Solar water pumping is the process of pumping water with the use of power generated by sunlight. Solar pumping systems are reliable stand-alone systems that require no fuel and very little attention. Solar panels generate maximum power in full sun conditions when larger quantities of water are typically needed.

Panels-

This demonstration unit has two 85 Watt panels convert the solar energy into electrical energy. In this system it is the only energy. No batteries are attached. They normally carry a 25 year warranty.

Sun Tracker-

Some system uses a tracker to follow the sun to increase the solar panel efficiency. The system I have used have passive tracking, meaning they take no power from the system, it operate from the heat of the sun striking the frame members. The frame member is warmed causing the Freon inside to move from one cylinder to the other as it follows the sun's heat. The tracker allows the system to pump an estimated 30-40% more water during the summer. Most likely it increases the pumping in the early parts of the morning and the late afternoon. Currently we are not using a tracker. They cost about \$500-600. The trackers come with a 10 year warranty.

This system we demonstrate here uses panels with more wattage and does not use the tracker.

Controller -

This electronic "magic" box converts the variable energy from the solar panel to the constant voltage for the pump. The controller include a pump speed control circuit, a remote switch circuit, a sensor-less low water cut-off circuit, an electronic circuit breaker and indicator lights.

Pump -

This is the part that does the actual pumping of the water. It is a diaphragm pump. This means the pump works on a positive displacement process. The pump has the capacity to pump water to greater height (greater head) without much decrease in volume. Pumping to greater height does require more energy from the solar panel. This pump has the capacity to pump to 100 ft of head (43 psi).

Do I need a water storage tank?

Storing water in a cistern or tank has many advantages. It's less expensive, more trouble-free and more efficient than storing power in batteries. Since water is always a critical issue, we recommend the tank should be able to store a minimum 3 to 6 days worth of water or whatever you think your needs may be during cloudy weather or in case of a system failure.

Generally speaking, animals, plants and humans use less water on cloudy days. Conversely, the sunniest days are when we consume the most water and when the solar panels are providing the pump with the most power.

Should I use batteries in my solar pumping system?

While batteries may seem like a good idea, they have a number of disadvantages in pumping systems. First, they reduce the efficiency of the overall system. Second, they are another source of problems and maintenance. Third, they add cost to the system.

Solar Pump System suppliers indicate livestock producers should "Store water and not power when possible and you will have much better performance and reliability with your solar pumping system."

Solar Pump System costs

for demonstration unit

Photovoltaic Panels

2 - 85 watt panels **\$470**

Solarland 85 Watt

Fixed Rack

DP-TPM2 Solarland 85 **\$205**

Controller

SolarJack PCA 30-M1D **\$275**

Pump Wire

10-2 w/grn. **\$155**

100 ft x \$1.55/ft

MC4 interconnect

\$ 38

Pump

Sun Pumps SDS-Q-130 **\$976**

Freight to Eastern Kansas about

\$155

Prices - April 25, 2012

\$2,274



Sunpumps: (diaphragm pump, brass and stainless steel, with brushes, design for shallow well), (air filled motor cavity), (DC power only).

Grundfos: Sqflex pumps, CU200 controller, Pole Mount ,Solar Panels, **\$3152**

(Helical rotor pump, stainless steel, brushless, design for deep wells), (oil filled motor cavity for lubrication and heat dissipation), (AC or DC powered)

Bison: BSP pump, SPC Controller, Pole Mount, Solar Panels, **\$2425**

(Helical rotor pump, stainless steel, brushless, design for deep wells), (oil filled motor cavity for lubrication and heat dissipation), (AC or DC powered)

How much water can a solar pump supply?

These Sunpumps can pump at the rate 4 to 5 gallon per minute in full sun for about 2000 gallon per day. The maximum head of water = 100 ft (or 43 psi), (a slower rate pump can pump up to 200 ft head (or 86 psi)).

The Grundfos and Bison pumps can pump similar gallons with the same wattage of panels, these pumps have the capability to pump 300+ ft head..

Below is a list of the dealers that I know of for the eastern Kansas area:

Sun Pumps	Safford, Arizona	(Jim Allen)	800-370-8115	www.sunpumps.com
Panhandle Sales & Service	Beaver, Oklahoma	(Brandy Nelson)	580-525-1919	580-646-0911 www.solarwellpumps.com
Solar Water Technologies Inc.	317 S Sindny Baker St, Kerrville, TX		800-952-7221	www.solarwater.com
Robinson Solar System	207 West Main, Canton, OK		866-519-7892	www.solarpumps.com
Oak Grove Fabrications	RR1 Box 69, 15221 Schmedemann Rd , Alta Vista, KS		785-499-5311	
Lyman Inc.	Medicine Lodge, Kansas (Dean)		620-886-5731	
Preferred Pump	1441 N. Wabash, Wichita, KS	(John Blaine)	888-669-9897	620-960-7344 (mobile)

Solar Pumping System options

When wishing to have a **pressurized water system**,

I have found the following item effective:

- 2 gal pressure tank (\$40)
- Pressure switch (preset at 15-30 psi. or less) (\$15),
- Pressure Gauge (\$7), check valve (\$7)
- (with all other connections and adapters ,
- the system will cost about \$100 total)

Any **float valve** can work.

I have found the Hudson float valve effective (\$30)

When wanting to store energy to be used at nights or cloudy weather, batteries are required.

This system requires 24 Volt DC.

Use 2-12 Volt Marine-type **deep cycle batteries** (\$65 each).

I believe we should include a **charge regulator** when using storage batteries.

I have used a Morningstar SS-10L-24V (\$65)